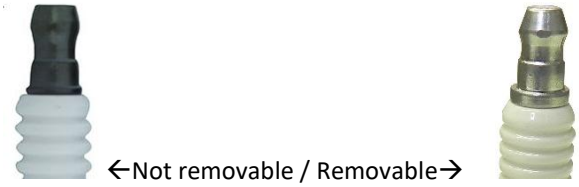
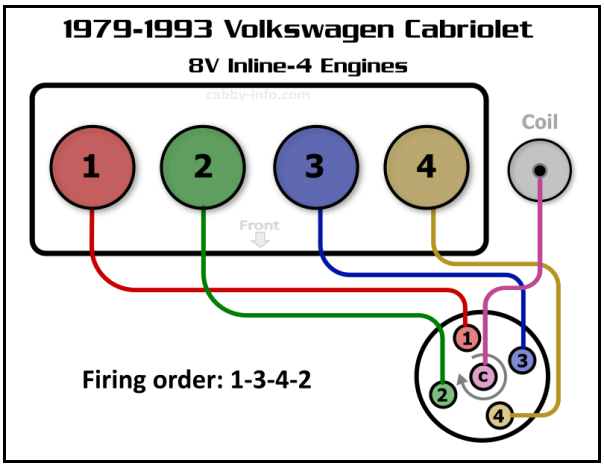
Volkswagen Cabriolet
DIY Guide: Spark Plugs

Spark plug gap: 0.028"/0.7mm. Plugs come pre-gapped; however, it is good practice to check all new plugs with a plug gapping tool like those shown below.

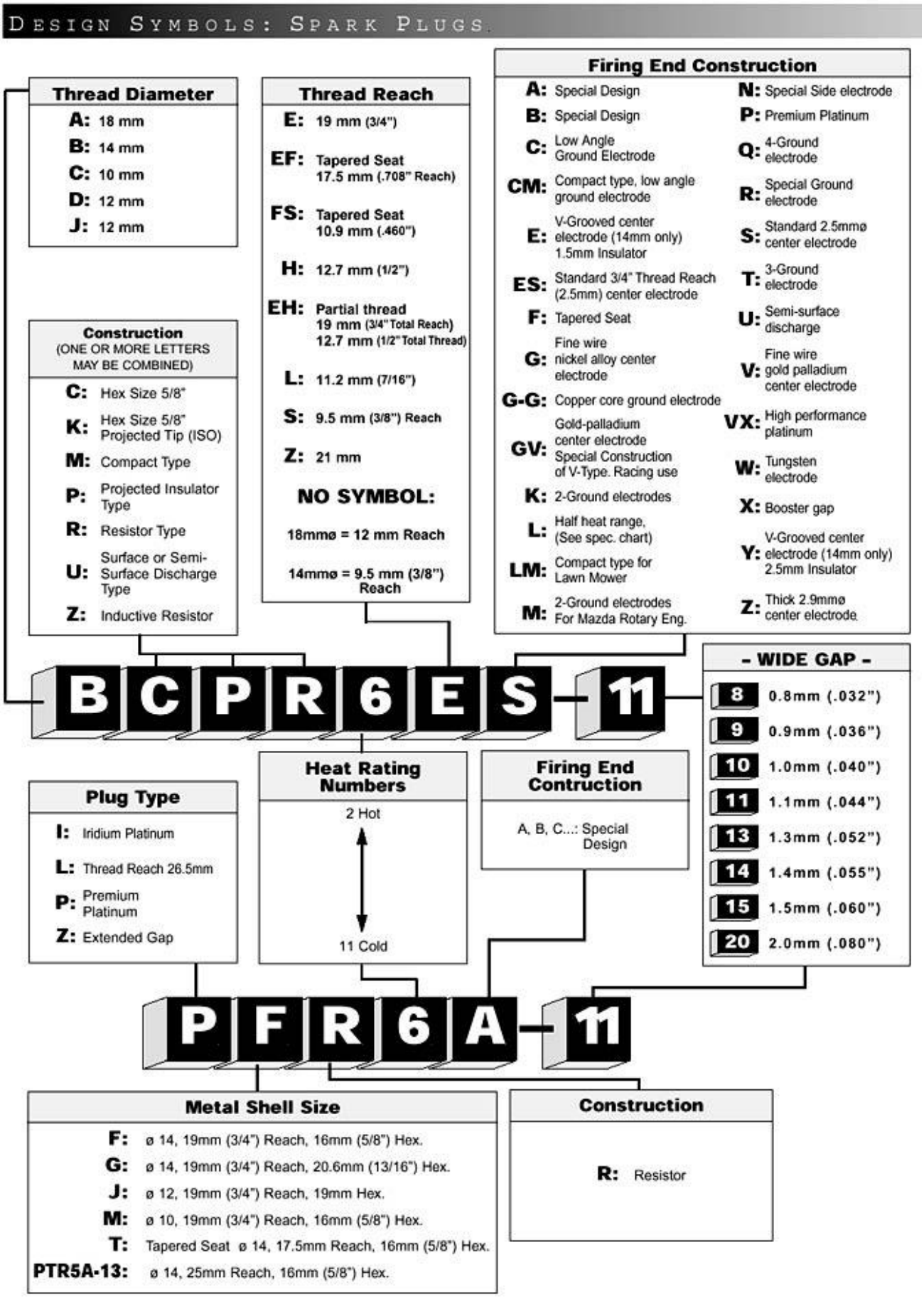
Spark plug terminal:

These cars use plugs with a threaded terminal. If your new plugs come with a terminal nut installed, unscrew it and throw it away.	NGK plugs differentiate between removable nuts and non-removable by color:  ←Not removable / Removable→

Firing order: 1-3-4-2



NGK numbering system:


DESIGN SYMBOLS: SPARK PLUGS
Thread Diameter
A: 18 mm
B: 14 mm
C: 10 mm
D: 12 mm
J: 12 mm
Thread Reach
E: 19 mm (3/4")
EF: Tapered Seat 17.5 mm (.708" Reach)
FS: Tapered Seat 10.9 mm (.460")
H: 12.7 mm (1/2")
EH: Partial thread 19 mm (3/4" Total Reach) 12.7 mm (1/2" Total Thread)
L: 11.2 mm (7/16")
S: 9.5 mm (3/8") Reach
Z: 21 mm
NO SYMBOL:
18mmø = 12 mm Reach
14mmø = 9.5 mm (3/8") Reach
Firing End Construction
A: Special Design
B: Special Design
C: Low Angle Ground Electrode
CM: Compact type, low angle ground electrode
E: V-Grooved center electrode (14mm only) 1.5mm Insulator
ES: Standard 3/4" Thread Reach (2.5mm) center electrode
F: Tapered Seat
G: Fine wire nickel alloy center electrode
G-G: Copper core ground electrode
GV: Gold-palladium center electrode Special Construction of V-Type. Racing use
K: 2-Ground electrodes
L: Half heat range, (See spec. chart)
LM: Compact type for Lawn Mower
M: 2-Ground electrodes For Mazda Rotary Eng.
N: Special Side electrode
P: Premium Platinum
Q: 4-Ground electrode
R: Special Ground electrode
S: Standard 2.5mmø center electrode
T: 3-Ground electrode
U: Semi-surface discharge
V: Fine wire gold palladium center electrode
VX: High performance platinum
W: Tungsten electrode
X: Booster gap
Y: V-Grooved center electrode (14mm only) 2.5mm Insulator
Z: Thick 2.9mmø center electrode
Construction
(ONE OR MORE LETTERS MAY BE COMBINED)
C: Hex Size 5/8"
K: Hex Size 5/8" Projected Tip (ISO)
M: Compact Type
P: Projected Insulator Type
R: Resistor Type
U: Surface or Semi-Surface Discharge Type
Z: Inductive Resistor
B C P R 6 E S – 11
– WIDE GAP –
8 0.8mm (.032")
9 0.9mm (.036")
10 1.0mm (.040")
11 1.1mm (.044")
13 1.3mm (.052")
14 1.4mm (.055")
15 1.5mm (.060")
20 2.0mm (.080")
Plug Type
I: Iridium Platinum
L: Thread Reach 26.5mm
P: Premium Platinum
Z: Extended Gap
Heat Rating Numbers
2 Hot
11 Cold
Firing End Contruction
A, B, C...: Special Design
P F R 6 A – 11
Metal Shell Size
F: ø 14, 19mm (3/4") Reach, 16mm (5/8") Hex.
G: ø 14, 19mm (3/4") Reach, 20.6mm (13/16") Hex.
J: ø 12, 19mm (3/4") Reach, 19mm Hex.
M: ø 10, 19mm (3/4") Reach, 16mm (5/8") Hex.
T: Tapered Seat ø 14, 17.5mm Reach, 16mm (5/8") Hex.
PTR5A-13: ø 14, 25mm Reach, 16mm (5/8") Hex.
Construction
R: Resistor

Diagnostics:

DIAGNOSTIC CHART

Normal	Normal	Normal
Using Unleaded Petrol	Using Lead Replacement Petrol	Using Lead Replacement Petrol

Symptoms	Causes	Remedy
• Hard starting • Misfiring • Black exhaust smoke	**Carbon Fouled** • Rich mixture • Retarded ignition • Low compression • Too cold a spark plug	• Check float level • Check choke • Check ignition timing • Check air cleaner • Check compression • Replace spark plug with correct heat range
• Hard starting • Misfiring • Grey / white exhaust smoke • Loss of oil	**Oil Fouled** • Worn rings • Worn piston • Leaking valve stem seals • Over-filled oil sump	• Replace worn components • Replace spark plug with correct heat range
• "Pinking" under acceleration or climbing hills • Engine run-on after switching off	**Overheated** • Lean mixture • Advanced ignition timing • Too hot a spark plug	• Check jets are not clogged • Check float level • Check ignition timing • Replace spark plug with correct heat range
• Misfiring • Loss of power • Hard starting • Noise in engine	**Damaged** • Foreign particles inside cylinder • Broken or damaged valve	• Replace spark plugs • Remove foreign or damaged components
• Melted spark plug • Damaged piston crown • Damage to cylinder head	**Under Tightened** • Spark plug incorrectly torqued • Spark plug only hand tightened • Dirt or carbon in threads of cylinder head	• Replace spark plugs • Tighten spark plug to correct torque • Replace damaged components • Check compression on all cylinders
• Hard starting • Reduced fuel economy	**Worn** • Normal electrode wear • ±0.03mm / 1 000km • Fuel deposits (carbon, lead, additives & salts)	• Replace spark plug with correct heat range
• Redish brown stain above metal shell on insulator	**Corona Stain** • Oil particles suspended in the air adhere to the insulator due to high voltage Corona Stain	• No deteriation to the function of the spark plug • Change spark plug ONLY at recommended service intervals

Normal Combustion deposits are slight and not heavy enough to cause any detrimental effect on engine performance. Note the brown to greyish tan color, and minimal amount of electrode erosion which clearly indicates the plug is in the correct heat range and has been operating in a "healthy" engine.	**Mechanical Damage** May be caused by a foreign object that has accidentally entered the combustion chamber. When this condition is discovered, check the other cylinders to prevent a recurrence, since it is possible for a small object to "travel" from one cylinder to another where a large degree of valve overlap exists. This condition may also be due to improper reach spark plugs that permit the piston to touch or collide with the firing end.	**Oil Fouled** Too much oil is entering the combustion chamber. This is often caused by piston rings or cylinder walls that are badly worn. Oil may also be pulled into the chamber because of excessive clearance in the valve stem guides. If the PCV valve is plugged or inoperative it can cause a build-up of crankcase pressure which can force oil and oil vapors past the rings and valve guides into the combustion chamber.
Overheated A clean, white insulator firing tip and/or excessive electrode erosion indicates this spark plug condition. k This is often caused by over advanced ignition, timing, poor engine cooling system efficiency (scale, stoppages, low level), a very lean air/fuel mixture, or a leaking intake manifold. When these conditions prevail, even a plug of the correct heat range will overheat.	**Insulator Glazing** Glazing appears as a yellowish, varnish-like color. This condition indicates that spark plug temperatures have risen suddenly during a hard, fast acceleration period. As a result, normal combustion deposits do not have an opportunity to "fluff-off" as they normally do. Instead, they melt to form a conductive coating and misfire will occur.	**Pre-Ignition** Usually one or a combination of several engine operating conditions are the prime causes of pre-ignition. It may originate from glowing combustion chamber deposits, hot spots in the combustion chamber due to poor control of engine heat, cross-firing (electrical induction between spark plug wires), or the plug heat range is too high for the engine or its operating conditions.
Gap Bridging Rarely occurs in automotive engines, however, this condition is caused by similar conditions that produce splash fouling. Combustion deposits thrown loose may lodge between the electrodes, causing a dead short and misfire. Fluffy materials that accumulate on the side electrode may melt to bridge the gap when the engine is suddenly put under a heavy load.	**Splash Fouled** Appears as "spotted" deposits on the firing tip of the insulator and often occurs after a long delayed tune-up. By-products of combustion may loosen suddenly when normal combustion temperatures are restored. During hard acceleration these materials shed from the piston crown or valve heads, and are thrown against the hot insulator surface.	**Detonation** This form of abnormal combustion has fractured the insulator core nose of the plug. The explosion that occurs in this situation apples extreme pressures on internal engine components. Prime causes include ignition time advanced too far, lean air/fuel mixtures, and insufficient octane rating of the gasoline.
Ash Fouled A build-up of combustion deposits stemming primarily from the burning of oil and/or fuel additives during normal combustion ... normally non-conductive. When heavier deposits are allowed to accumulate over a longer mileage period, they can "mask" the spark, resulting in a plug misfire condition.	**Carbon Fouled** Soft, black, sooty deposits easily identify this plug condition. This is most often caused by an over-rich, air/fuel mixture. Check for a sticking choke, clogged air cleaner, or a carburetor problem - float level high, defective needle or seat, etc. This may also be attributed to weak ignition voltage, an inoperative preheating system (carburetor intake air), or extremely low cylinder compression.	**Worn** This plug has served its useful life and should be replaced. The voltage required to fire the plug has approximately doubled and will continue to increase with additional miles of travel. Even higher voltage requirements, as much as 100% above normal, may occur when the engine is quickly accelerated. Poor engine performance and a loss in fuel economy are traits of a worn spark

SOURCE: Champion Spark Plugs